**TEACHING FOR UNDERSTANDING UNIT/PROJECT ORGANIZER:**

**HEADING INFORMATION:**

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| **Your Name or Team Names:**  Terri Skeie, Armando Herbelin, Bryn Byker | **This Column is for Coach Comments** |
| **Date: 4/25/2011** |  |
| **Title of Your Unit or Project:**  **Decoding the Mathematics behind the Label** |  |
| **Setting for the Unit or Project:** Classroom |  |
| **Subject Area:** Pre-College Math |  |
| **Grade Level:** Pre-College |  |
| **Learners Who Will Experience the Unit/Project: \_\_ advanced; \_\_\_ mixed achievement; \_\_other \_X\_adults** |  |
| **Approximate Time the Unit or Project May Take:**  2 weeks (10 class hours) |  |
| **Major Resources Needed:** |  |
| **Brief Summary of Your Unit or Project:**  Students will search for and collect a variety of food labels during their regular trips to the grocery store. In class, we will examine these labels, exploring the possible ways that the nutrition facts could be used to persuade consumers to buy a certain product. Students will become better consumers and know when marketers might be using these numbers in a way that could be misleading. |  |

**Generative Topic [GT] What is your Generative Topic?**

# Food and the lies they tell you. Why percents are used in the real world.

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| 1. **Centrality:** (In which discipline do you see your topic as central, and why do you believe this topic of central importance to your discipline?)   Our topic is central to math but also integrates strategies used and employed by expert marketers, advertisers, and nutritionists. |  |
| 1. **Engagement:** Why will it interest you and your intended audience (learners)--or have the potential to become interesting? How might you make it interesting to your intended audience?   Since we all buy and eat food, we need to understand the nutrition labels on our food. Students will become better consumers and know when marketers might be misleading them. |  |
| 1. **Accessibility:** What are 2-3 specific examples of resources related to the topic that are available?   On their regular trip to the grocery store, students will examine the food they would ordinarily buy, checking the nutritional labels for potentially interesting information.  We will also use online programs to get nutrition information, the online recipe to nutrition label converter, and the food pyramid from the FDA. |  |
| 1. **Connections:** How does the topic relate to other topics in the discipline, to other disciplines, and beyond the disciplines to life in the world at large?   Students will work on math concepts such as ratios, proportions, percentages, unit conversion, decimals, and fractions. These same skills are used in chemistry and nutrition classes and by the everyday nurse. Domestic engineers will also use these when planning meals and purchasing at the grocery store. |  |
| **5.   Challenges:** Describe what may be potential “troublesome knowledge”--  challenges for your intended audience in understanding this topic and  how you might design the project/unit to address likely challenges  Students may get stuck on the preconceived notion that the label will tell them what they need to know.  Word problems are always difficult for students. One of our main goals is getting the students to look at whether the answer ‘reasonable’?  Distraction elements exist whenever we do something out of the ordinary. Fortunately, nutrition is a central topic to our lives and will very nicely illustrate the usefulness of math. |  |
| **Your Summary Reflection**: (Briefly summarize major points from your analysis of your Generative Topic (above, 1-5). Using some of the points above, explain why this is a strong Generative Topic for your unit/project.  Our Generative Topic is strong for a several reasons. Materials for the unit are easily accessed, since students will be asked to collect and use information from food labels that they would buy regardless. Although a certain element of distraction exists whenever we do something out of the ordinary, stepping out of the textbook also fuels excitement and interest. In addition, anytime we use real life application, understanding deepens. We also predict that by using the concept of ‘decoding’ potentially misleading labels, students will be likely to introduce the idea to family and/or friends, further enhancing their own understanding of both the Generative Topic and the embedded math skills. |  |

**Unit/PROJECT-Level Understanding Goals [UGs]—**

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| **UG 1**  **Question:**  How do decimals, fractions and percents relate to each other and how can this be used to solve problems?  **Statement:**  Students will work comfortably with fractions, decimals and percents and use these skills to solve ratio, proportion and percent problems.   (They will use these skills to understand the data found on a nutrition label.) | **UG 2**  **Question:**  How can the information in a percent word problem be translated into a mathematical equation?  **Statement:**  Students will translate real world application problems into equations that they can solve.  (They will translate nutritional information into mathematical equations. For example, the amount of fat will be calculated using the nutritional information and this will be compared to the advertisement on the label.) | **UG3 3**  **Question:**  How can you calculate percents of increase and decrease, or find an unknown percent?  **Statement:**  After being shown several examples, students will follow appropriate steps to solve similar percentage problems.   (Using nutritional guides, they will compare such things as the daily nutritional values with dietary recommendations.) | **UG 4**  **Question:**  How can you determine things such as sales tax, commissions and discounts and interpret data found in charts and tables?  **Statement:**  Students will understand how to solve different types of percent and proportion problems by using the skills they have learned in the unit.  (They will look at other nutritional values such as protein or sodium and compare the numbers to dietary recommendations.) | **This Column is for Coach Comments** |

**Performances of Understanding [PoU]….................. and................……. Ongoing Assessments**

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| **Understanding goals** | **Performances of Understanding**  (What will learners say, do, or make to learn your Understanding Goals and to demonstrate that they understand your Understanding Goals?) | **Ongoing Assessments**  How will you know learners understand? What evidence/criteria should an assessor be looking for in "high quality work/thought in EACH performance?" Give a few examples of what an assessor might predict that learners will do or say or what criteria an assessor might use to assess learner understanding (products, presentations…) in "high level" work for EACH of your Performances? Let the questions below help in the design of your assessments. | **This Column is for Coach Comments** |
|  | **Performance 1**   1. Students are asked to come up with their idea of a balanced diet. If someone consumes 2000 calories a day, how many calories do they think that person should consume in carbohydrates, fats and protein. They will translate this information into a fraction and a decimal. (Introduce concept of %, decimal, fraction). Students are given some data about recommended daily nutrition guidelines. A typical adult should consume 50% of their calories in carbohydrates, 31% in fat and 19% in protein. How did this compare to the values that they determined? | **Who**: Peer / Self  **What:** Work and answer from initial % calculations.  **How**: Informal but using a rubric with boxes for: *Correct Answer, Showing Work,* *Neatness, and Overall Score*.  **Looking for what**? High-level understanding will be demonstrated by having a meaningful visual, correct conversion of fraction to percent, you can follow their work, and explain it to peer, and all of the percentages add up to 100%. |  |
|  | **Performance 2- Introductory**  Students will be given one of the following eating guides. What percent do they believe each piece represents?  Plate  **http://1.bp.blogspot.com/_4uIVUR4AhZ8/TU2hjsplxUI/AAAAAAAAAHI/YMgfTbC2FMU/s1600/Food_Guide_Pyramid_USDA.jpg** | **Who**? Self  **What**? Evaluate numbers assigned to the graph. Do they add up to 100%?  **How**? Informal  **Looking for what?** Reasonable results. Add up to 100% |  |
|  | **Performance 3- Guided Inquiry**   1. Students will be given a nutrition label for milk.   Read the milk label.  List five pieces of information it gives you.       calories, fat, sodium, protein, vitamins, zero trans fat,  wow - 11 grams of sugars!, 33% calcium    Compare your list with the person next to you.  Discuss what they saw that you didn't list.  As a team, decide on the two most important pieces of information.  Briefly explain why you chose those two.       students' answers will vary.  Likely important bits will be calories, serving size and fat.  Athletes might focus on protein.  Some students might see the sodium numbers.    What is the serving size?  List the number and units in two different measurements.       1 cup,  244 g   What is the total mass of fat in grams?       10 g   When you choose milk in the grocery store, which kinds are available?      skim, 1%, 2%, whole, soy, rice, enriched...   Calculate the percent fat in this milk.  Remember, Percent (%) = part/whole \* 100. ( Fat cal/total cal.)   % = 10 g fat / 244 g milk \*100 = 4.1 %   Use words to explain why you multiply by 100 in the formula.     Because the ratio 10/244 gives a fraction.  Percent is the fraction \*100.  Note, students may have trouble verbalizing this answer but being able to write it out in words should help cement the knowledge.   Based on your data, what kind of milk is this?     Since it is not 0%, 1%, or 2%, it must be whole milk. | Same process as above. |  |
|  | **Performance 4 Guided**   1. Add up the mass of Total Fat, Total Carbohydrates, and Protein.      10g + 11g + 9g = 30 g  Like sodium and cholesterol, the vitamins are a very small mass (measured in mg which is 1/1000 of a gram)  What do you think the rest of the milk is made of?  water...  If the milk is 244 g and there is about 30 g of fat, carbs, and protein, how many grams of water is there?  244 - 30 = 214 g  What % water is the milk?   1. water  / 244 g milk \* 100 = 87.7%    Does 4% fat sound that bad?  probably not    Let's look at fat in terms of calories instead of grams.  This makes sense because the water is just filler.   a.  What is the total number of calories in 1 cup of milk?   168  b.  How many calories from fat? 89  c.  What is the % fat by calories?          %fat =  89 calories of fat / 168 calories total \* 100 = 53.0 %  OUCH! | Same process as above. |  |
|  | **Performance 5- Guided**   1. Imagine you wanted to get 100% of your calcium from milk.  The following questions will help you decide how much to drink.   a.  What is % Calcium in the milk?   33%  b.  What fraction is close to this number?   1/3  c.  In your head, how many servingsss of milk will you need to drink to get the full RDA?  3 cups  d.  Set up a math equation to calculate this answer.  1/3(x) = 1 cup,  x = 1 cup \*3 = 3 cups.    How many grams of fat will you get drinking this much?  10 g \* 3 = 30 g.  How many total grams will you drink?        244 g \* 3 = 732 g  Use these numbers to calculate the percent fat in the milk.  30 g / 732 g milk \* 100 = 4.1 %  What is interesting about this answer?  It is the same percentage as before!  Explain how this answer can be the same as before...  Percent fat does not depend on how much you have.  If you had 10 cups of milk, you'd still be drinking 4.1% fat.  Of course you'd get a lot of fat! | Same process as above. |  |
|  | **Performance 6- Culminating**  Students will find labels in a store that make a statement about fat. They will calculate the actual amount of fat in a regular item and the lower fat item. With the given information, they will determine how the marketer makes the claim and what the % of decrease in fat and calories would be if they switched to the lower fat item. How does this % fat compare to the daily recommended amounts? | **Who**? Instructor  **What**? Looking at project and evaluating data, calculations, accuracy.  **How**? Formal  **Looking for what**? Did they actually answer the question? Did they do the full assignment? Are calculations the right ones and done without error? Quality of communication both visually in writing? Does this project demonstrate that the student understands all facets (learning objectives) of the unit? |  |
|  | **Performance 7-Culminating**  Students will be given a recipe. Using a nutritional website, they will construct their own food label with all the given information. They will then figure out an alternative recipe that would lower the fat, sodium, etc. They will also create a menu for the day that will stay within the recommended amounts discussed in the introductory eating guide. | **Who**? Instructor  **What**? Evaluating printed result from web site.  **How**? Formally  **Looking for what**? Completeness and correct calculations (the math needs to be correct!) . Also, not doing something extra easy such as nutritional analysis of rock candy (100% sugar) |  |